

NEW ROTIFERA FROM AUSTRALIA

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Summary

KOSTE, W. & SHIEL, R. J. (1980) New Rotifera from Australia. *Trans. R. Soc. S. Aust.* **104**(5), 133-144, 28 November, 1980.

One hundred taxa of Rotifera, including six species: *Lepadella chengalathi*, *L. williamsi*, *Lindia deridderi* Koste, 1979, *Testudinella walkeri*, *Filinia australiensis* Koste, 1980 and *F. hofmanni* Koste, 1980 and five new subspecies are recorded from Australia for the first time. Eight new taxa in the genera *Brachionus*, *Keratella*, *Lepadella*, *Lecane*, *Dicranophorus* and *Testudinella* are described and figured. Other species names, with ecological and locality information, are listed systematically.

Introduction

Rotifera are found in virtually all inland waters. They are usually the numerically dominant component of the zooplankton of lakes, rivers, billabongs and swamps, providing an important link in aquatic food chains between the nannoplankton (i.e. less than 60 μ m, including bacteria and micro-algae) and the carnivorous zooplankton.

Publication of the first checklist of the Australian Rotifera (Shiel & Koste 1979) and a review of the Australian species of *Brachionus* and *Keratella* (Koste 1979) has resulted in increased interest in the rotifer fauna. Workers locally and overseas have communicated papers and collections, enabling the faunal list to be expanded. The first material from the Northern Territory has been examined, and access has been provided to collections from Tasmania and Western Australia. Material from the other States has been collected during a survey of the zooplankton of the Murray-Darling system (Shiel 1978, 1979).

Consequently, while this paper adds to the known rotifer fauna of the continent, it must be considered as a preliminary to a more comprehensive treatment at a later date, in which illustrated keys will be provided for assistance in identification of the Australian Rotifera. At present, taxonomic references in which many of the cosmopolitan taxa are figured include Bartos (1959), Kutikova (1970) and Koste (1978), none of which is readily accessible to the English-speaking Australian limnologist.

One hundred taxa of Rotifera are recorded from Australia for the first time. In addition, three species (*Ascomorpha saltans*, *Pomphalyx*

sulcata and *Testudinella amphora*) are recorded by Sudzuki & Timms (1980) from farm dams in N.S.W. These species were recorded in the present study and are retained in the listing to provide ecological information. Sudzuki & Timms' record of *Filinia major* is considered synonymous with *F. terminalis* (see Koste 1978). A further three species described by Berzips (1961) were omitted from the original checklist, and are included here, bringing the recognised Rotifera taxa from Australia to 437. In some cases, taxa having minor differences from the type at the sub-specific or varietal level are the only representatives of the species recorded to date from the continent, and are therefore included in the record as distinct taxa following the principles of Mayr (1969).

Although it would be premature to give detailed ecological information on the collections, particularly since material from large areas of the continent has yet to be examined, we include information on the habitats from which the various taxa are recorded. The format adopted is as follows:

All records are listed systematically (after Koste 1978). Habitat type is indicated by:

L: lake or impoundment, with name of locality;

R: river or stream, with nearest town named;

B: billabong (standing waters on the floodplain), with nearest town or settlement named.

The season of collection is given as W: winter; Sp: spring; Su: summer and A: autumn.

Physico-chemical data is given in the sequence: temperature in °C (measured with a Yellow-Springs Instrument Company thermometer); pH (Metrohm portable pH meter);

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dissolved oxygen (YSI DO meter); turbidity (Hach turbidimeter, or where a metric measurement is given, by Secchi disc); conductivity (Radiometer CDM2 conductivity meter). In the example given below, the units of measurement for each parameter are given in parentheses:

Lecane stichaea Harring, 1913

Loc: R, Mannum, S.A., W; 11.0 (°C), 8.4 (pH), 10.8

(DO in ppm), 40 (turbidity in Nephelometric Turbidity Units), 575 ($\mu\text{S cm}^{-1}$).

Several species came from collections other than by us. For these, physico-chemical data were not available to us.

No distinction is made between planktonic and littoral species. Seasonal variation occurs, particularly when billabong species are flushed into rivers to constitute the plankton in times of flood, as occurs in the Murray (Shiel 1979). Other species become established during algal blooms in lakes and rivers, using algal filaments or mats as substrates for attachment, and are thus seasonal or facultative plankters.

New taxa only are figured, with the exception of *Brachionus lyratus* Shephard (Fig. 1). This species was previously considered to be synonymous with *B. caudatus* (Ahlstrom 1943), however present samples indicate that the species is valid.

Abbreviations for the locations of type material are: ZMK, Zoological Museum, University of Kiel, D-2300, F.R.G.; SAM, South Australian Museum.

Systematics

ORDER BDELLOIDA

(See Shiel & Koste 1979, for known Australian bdelloid rotifers).

ORDER PLOIMIDAE Hudson & Gosse, 1886

Family Epiphanidae Bartos, 1959

Liliferotrocha subtilis (Rodewald), 1940

Loc: B, Thornton, Vic., A; 17.8, 7.1, 8.9, 28.

Rhinoglena frontalis (Ehrenberg), 1853

Loc: B, Yarrowonga, Vic., Sp; 14.5, 8.2, 12.5, 18, 74.

Family Brachionidae Kutikova, 1970

Brachionus quadridentatus f. *brevispinus* (Ehrenberg) 1832

Loc: L, Boort, Vic., Su; 23.5, 7.9, 6.0, 67, 750.

B. quadridentatus f. *clunioribicularis* (Skorikow) 1894

Loc: B, Wodonga, Vic., Su,

B. variabilis (Hempel) 1896

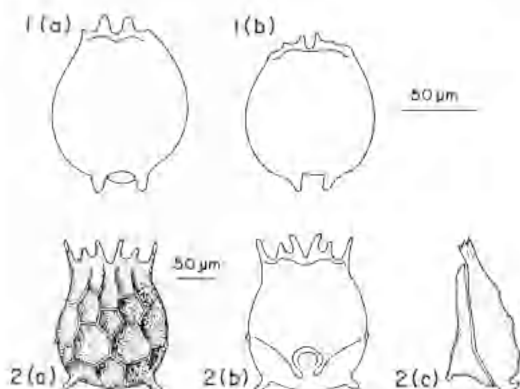
Loc: B, Wodonga, Vic., Su.

B. lyratus Shephard, 1911 (Fig. 1)

Trophi preparation, Rot, No. 023, ZMK.

In Koste (1979) a *Brachionus* resembling that described by Shephard (1911) was figured. Harring (1913) suggested synonymy of the form with *B. angularis caudatus* Barrois & Daday 1894. Voigt (1937) considered the form insufficiently known, and Ahlstrom (1940) considered it synonymous with *B. angularis*. Examination of recent collections supports Shephard's comments on the peculiar morphological characteristics of this distinctive species. In particular, the presence of submedian spines, absent in *B. angularis*, and the "two knobbed projections (posteromedian spines) which curve outward in a manner suggesting the form of a lyre". Such foot-opening spines are not described for *B. angularis* or *B. caudatus*. On the basis of these taxonomic characteristics the independence of *B. lyratus* in the *Formenkreis angularis* is recognized. This now comprises the species groups *angularis*, *charini*, *dichotomus*, *dolabratus*, *forficula* and *lyratus* (see Koste 1978).

Measurements: Lorica length 120–145 μm , lorica width 90–96 μm , foot-opening width 20–24 μm , head-opening width 60–64 μm , subitaneous egg 65/45 μm .



Figs 1–2 1—*Brachionus lyratus* Shephard, 1911. a, b. Lorica, ventral. Fig. 2—*B. bidentatus* f. *testudinarius* (Jakubskii) 1912. a. Lorica, dorsal, b. Lorica, ventral, c. Lorica lateral. Lorica length 220 μm . (cf. Fig. 4a, b).

Loc: B, Thornton, Vic., A; 17.8, 7.1, 8.9, 28,

B. dimidiatus (Bryce) 1931

Loc: B, Wodonga, Vic., A.

B. urceolaris sessilis (Varga) 1951

Loc: B, Jabiluka, N.T., W; 25.0, 6.15, 3.7, —, 48.

B. dichotomus reductus Koste & Shiel, 1979

Loc: B, Eskdale, Vic., Su; 29.2, 7.5, 8.0, 6, 85.

B. bidentata Anderson, 1889 (Figs 2–4)

***B. bidentata minor* n.ssp.**

(FIG. 3a–h)

Material: 16 contracted females, sample No. 295, in formalin.

Holotype: loricate female, sample No. 295, coll. 28.xii.77, R. J. Shiel, Rot. No. 025, ZMK.

Paratypes: SAM, V.2092, Koste collection, Quakenbrück, F.R.G.

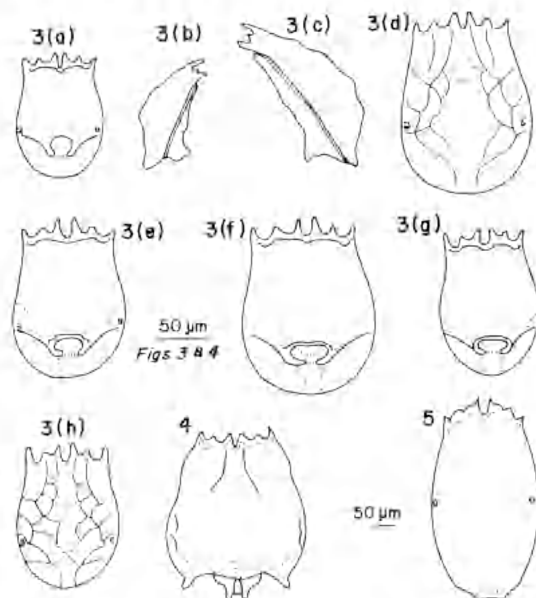
Iconotype: Fig. nostra 3a,b.

Type locality: River Murray, Mannum, S.A. (34°50'S/139°18'E).

Description: Small barrel-shaped lorica with six dorsal anterior spines. Short, unforked marginal spines (cf. Fig. 2c). Basal plate present. Semicircular dorsal lorica border. Anterior border of ventral plate slightly indented medially. Highly placed circular foot-opening. Posteromedian spines terminally button-shaped. Posterolateral spines absent. In larger specimens slight facettation dorsally (Fig. 3d, h). Lateral antennae marginally placed.

Measurements: Lorica length 120–156 μm , lorica height 52–80 μm , greatest lorica width 84–108 μm , range of marginal spines 72–104 μm .

Discussion: The lorica shows comparative similarity to that of *B. bidentata* f. *inermis* (Rousselet) 1906. The latter however has long marginal spines, absent in *minor*. Moreover, this morph is an intermediate to *B. bidentata* f. *testudinarius* (Jakubski) 1912 (Fig. 2a–c), which has a short curved posterior spine. In the new subspecies the posterior border of the lorica is specifically semicircular. Comparison with *B. bidentata* f. *jirovci* (Bartos), 1947 (Hauer 1963; Kurikova 1970) shows that this infrasubspecies taxon, in contrast to *B. bidentata minor*, has forked marginal spines, and also occasionally posterolateral spines.



Figs 3–5. 3—*Brachionus bidentata minor* n.ssp. a. Lorica, dorsal. b,c. Lorica, ventral. d. Another lorica, dorsal. e–g. Different loricae, ventral. f. Lorica with dorsal structure (all from the same population). Fig. 4—*B. bidentata* f. *testudinarius*. Lorica, dorsal. Length 170 μm , width 140 μm . Fig. 5—*B. plicatilis colongulaciensis* n.ssp. Lorica, dorsal. Lorica length 400 μm .

Considering the great variability of the species *B. bidentata* an exact taxonomic classification of the different morphs is difficult. For example, with regard to length of lorica spine development, Pourriot (1974) showed experimentally that this depended on the presence of the predator *Asplanchna brightwelli*.

The new subspecies is considered here as a "dwarf-form" *sensu* Green's (1977) study, where food-storage, salinity of biotope, etc., caused a reduction of lorica-size in crater lake rotifers.

Therefore the classification of *B. bidentata minor* as a subspecies i.e. a genetically distinct form, is provisionally documented here, noting however that only a single collection is involved.

Loc: R, Mannum, S.A., Su; 17.0, 8.2, 9.7, 86, 1,020.

Brachionus bidentata f. ? *testudinarius*
(FIG. 4)

In one sample from Lake Nillahcootie, Vic. (36°53'S/146°01'E) on 27.ii.78 an individual animal resembling the f. *testudinarius* was collected. Forked marginal spines are absent,

however, and the dorsal lorica is unstructured. The lorica has a resemblance to *Brachionus quadridentatus* var. *ancylognathus* (Schmarda 1859), but the elongated marginal spines, distinct lorica basal plate and the tube-like foot orifice indicate that this is a morph of *B. bidentata*.

Measurements: Lorica length 164 μm , greatest lorica width 140 μm , marginal spine length 68 μm , posterior spine length 100 μm .

Loc: L, Nillahcootie, Vic., Su; 26.0, 7.9, 11.3, 24, 55.

***Brachionus plicatilis colongulaciensis* n.ssp.**

(FIG. 5)

Type material: 122 females of different ages, in formalin, sample number 647, collected by W. D. Williams, Lake Colongulac, Vic. (May 1979).

Holotype: Loricated female, coll. Williams 23.v.79, Rot.No.024, ZMK.

Paratype: SAM, V.2093; Koste collection, Quakenbrück, F.R.G.

Type locality: Lake Colongulac (salinity 10.4‰), W. Victoria (38°10'S/143°10'E).

Description: Greatly elongated transparent lorica. Surface unstructured. Anterior spines much reduced. Anterior border of ventral lorica with four short, flat, tongue-like projections. Posterior lorica margin tapered and rounded. Foot-opening terminal, lowered ventrally. Dorsal lateral antennae approximately level with mid-lorica. Ratio lorica length: width approximately 2:1.

Measurements: Lorica length (adult ♀) 400–440 μm , lorica width 210–240 μm , foot-opening width 40 μm , anterolateral spine development –75 μm , subitaneous egg 132–150 \times 90–110 μm .

Discussion: In the population examined, all adult females had an extraordinary large lorica, corresponding in appearance to that of *B. plicatilis* f. *decemcornis* Fadeev, 1925. The latter has a different foot-opening (see Koste 1978) and is smaller. Hauer (1925) describes an elongated form from Bad Oldesloe with a cross-sectioned lorica length of only 260 μm . A lorica of approximately corresponding outlines was figured by Ahlstrom (1940) with a length of 275 μm and a greatest width of 210 μm . Neither of these is in accord with the Australian find. The greatest lorica length known to date is 315 μm .

It is apparent that the new ssp. population has arisen in Lake Colongulac in response to specific ecological peculiarities of the habitat.

For the anatomy of this *Brachionus*, see Koste (1980a). For distribution of the species group see De Ridder (1960).

Loe: L, Colongulac, Vic., A; 12.7, 8.2, –, 42, 10.4 gm l⁻¹

***Keratella procurva* (Thorpe) 1891**

(FIG. 6a–k)

This pantropical species, known previously only in its typical form (see Ahlstrom 1943, Berzins 1955 and Koste 1978), shows considerable variability in posterior spine development and overall lorica size. Paggi (1973) figures and reports on a series of different lorica forms (Fig. 6h) from the Parana River, Argentina.

In the many Australian samples examined, this species occurred also with variable lorica forms. The most abundant forms are figured (6a,f,g,i). A previously unknown form of the species group (Fig. 6b–e,j,k), notable in respect to its smallness and form of posterior spines, is documented below.

***Keratella procurva robusta* n.ssp.**

(FIG. 6k)

Holotype: Female, coll. R. J. Shiel, Keepit Dam, N.S.W., 24.v.78, Rot. No. 026, ZMK.

Description: Short, squat, relatively wide and opaque lorica, ornamented with large pustules. Facetted as in f. typ., although with minor differences in populations from widely separated localities. All lorica spines, particularly short posterior spines, with wide bases (cf. Figs. 6b,j with 6d,h,i). Latter curved backwards in lateral view. Forms without caudal spines or with only a single posterolateral spine rudiment as in *K. tropica* (Apstein 1907) not recorded for *K. procurva*. Comparative morphological characteristics and measurements of known forms of *K. procurva* are as follows. In common forms (Figs 11a,f) the lorica surface is smooth or weakly granulated. Total lorica length from 155–220 μm ; lorica width 67–80 μm ; anterior spines 19–20, 17–22 and 30–40 μm and posterior spines 22–24 μm (left) and 27–64 μm (right). *K. procurva robusta* has a strongly studded lorica surface, total length 148–150 μm ; lorica width 82–90 μm ; anterior spines 15–17, 10–15 and 22–23 μm ; posterior spines 14–15 μm (left) and 20–23 μm (right).

Loe: L,B,R, Darling catchment, Su; 10.5–25.0, 7.4–8.7, 6.4–10.8, 270–1000, 15–1000, 15–115.

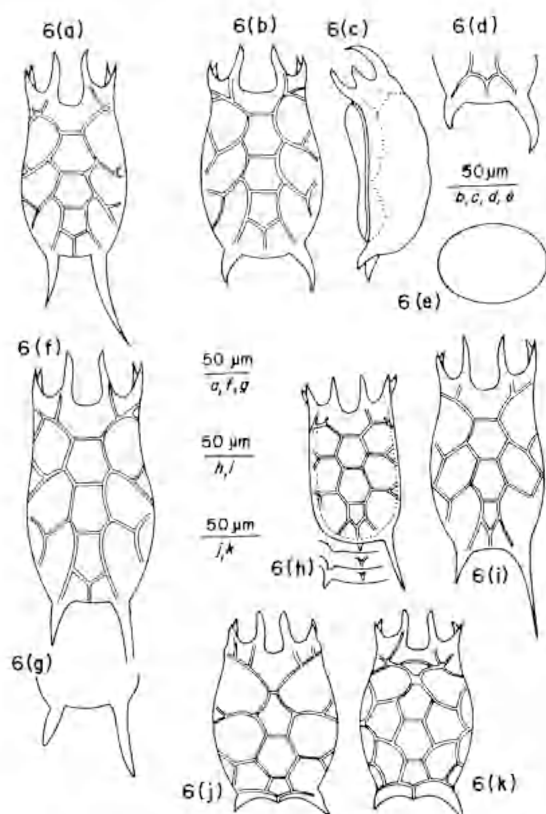


Fig. 6a. *Keratella procurva* (Thorpe) 1891. Lorica, dorsal. Morph with dorsolaterally curving posterior spines. S. Australia. Lorica length 220 μ m. b. *K. procurva robusta* n.ssp. Lorica, dorsal, length 150 μ m. c. Lorica, lateral. d. Another specimen. e. Subitaneous egg of *K. procurva robusta*. f-g. *K. procurva* type, common form from Australian waters. h. *K. procurva*, variations from Argentinian waters, S. America (after Paggi, 1973). i. *K. procurva* from Australian warm waters, N.T. Lorica length to 230 μ m. j,k. Two forms of *K. procurva robusta* from Darling River waters.

Notholca squamula (Muller), 1786

Loc: R, Donald, Vic., A; 11.0, 8.0, 11.2, -, -

Anuraeopsis navicula Rousselet, 1910

Loc: B, Yea, Vic., A; 10.5, 7.2, 10.1, 33, -

A. coelata De Beauchamp, 1932

Loc: B, Jabiluka, N.T., W; 25.0, 6.2, 3.0, -, 48.

Family Euchlanidae Bartos, 1959

Euchlanis dilatata f. *unisetata* (Leydig), 1854
Loc: B, Seymour, Vic., W; 10.0, 7.2, 11.6, 62, 330.

E. proxima Myers, 1930

Loc: R, Wyangala, N.S.W., Su; 15.5, 7.3, 10.2, -, -

Dipleuchlanis propatula (Gosse), 1886
Loc: B, Jabiluka, N.T., W; 25.5, 6.2, 2.9, -, 62.

Family Mytilinidae Bartos, 1959

Mytilia macracantha (Gosse), 1886

Loc: B, Jabiluka, N.T., W; 24.5, 6.3, 5.8, -, 59.

M. bisulcata Lucks, 1912

Loc: B, Jabiluka, N.T., W; 25.5, 6.2, 2.9, -, 62.

M. crassipes (Lucks), 1912

Loc: B, Jabiluka, N.T., W; 25.0, 6.2, 3.0, -, 48.

Family Trichotridae Bartos, 1959

Wolga spinifera (Western), 1894

Loc: R, Wentworth, N.S.W., A; 10.0, 8.0, 10.2, 12, 675.

Family Colurellidae Bartos, 1959

Colurella adriatica Ehrenberg, 1831

Loc: L, Boort, Vic., Su; 27.5, 7.9, 6.0, 67, 750, R, Benalla, Vic., A; 8.5, 7.0, 11.2, 21, 575.

Squatinnella mutica (Ehrenberg), 1832

Loc: B, Yea, Vic., A; 19.9, 7.2, 8.5, 0.8 m, 85.

Lepadella ehrenbergi (Perty), 1850

Loc: B, Jabiluka, N.T., W; 24.0, 6.25, 5.1, -, 42.

L. elliptica Wulfert, 1939

Loc: B, Jabiluka, N.T., W; 25.5, 6.2, 2.9, -, 62.

L. rhomboides rhomboides (Gosse), 1886

Loc: B, Jabiluka, N.T., W; 24.5, 6.3, 5.8, -, 59.

L. rhomboides f. *carinata* (Donner), 1934

Loc: R, Benalla, Vic., Su; 27.0, 7.6, 7.0, 52, -

L. dactyliseta (Stenroos), 1898

Loc: R, Benalla, Vic., Su; 27.0, 7.6, 7.0, 52, -

L. benjamini Harring, 1916

Loc: L, Boort, Vic., Su; 20.0, 7.4, 8.8, -, -
B, Jabiluka, N.T., W; 24.0, 6.25, 5.1, -, 42.

L. heterodactyla Fadeew, 1925

Loc: L, Boort, Vic., Su; 20.0, 7.4, 8.8, -, -

L. apsicora Myers, 1934

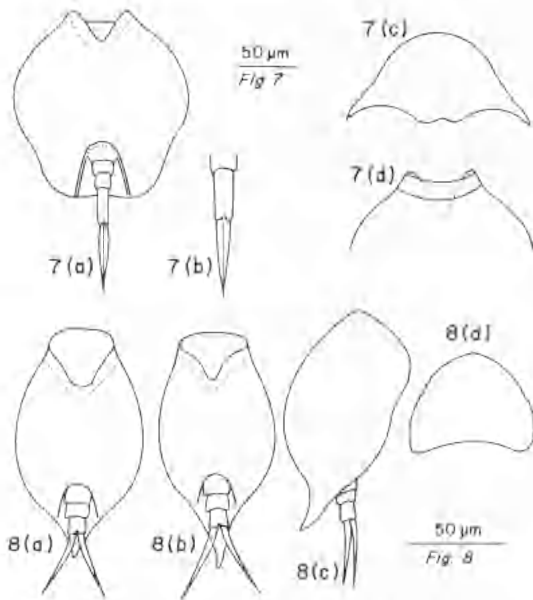
Loc: L, Boort, Vic., Su; 23.5, 7.9, 6.0, 67, 750.

L. nevoissi Berzins, 1960

Loc: R, Kinglake West, Vic., Sp.

L. ptilota Berzins, 1960

Loc: R, Clunes, Vic., W.



Figs 7-8. 7—*Lepadella chengalathi* n.sp. a. Lorica, ventral. b. Distal foot-segment with toes enlarged. c. Lorica cross-section. d. Neck aperture, dorsal. e. Ventral aspect. Fig. 8—*L. williamsi* n.sp. a,b. Ventral aspects of two loricas. c. Lateral view. d. Lorica cross-section.

L. angusta Berzins, 1960

Loc: R, Morang, Vic., Su.

L. monodactyla Berzins, 1960

Loc: B, Jabiluka, N.T. W: 25.5, 6.15, 2.9, —, 62.

L. heterostyla (Murray), 1913

Loc: L, Boort, Vic., Su; 23.5, 7.9, 6.0, 67, 750.

L. latissimus (Hilgendorf), 1899

Loc: R, Benalla, Vic., Su: 27.0, 7.6, 7.0, —, —.

***Lepadella chengalathi* sp.nov.**

(FIG. 7a-e)

Type material: 3 loricate ♀♀, sample number 307.

Holotype: Female, sample number 307, coll. R. J. Shiel, Rot No. 021, ZMK.

Type locality: Lake Boort, endorheic (internal) drainage, near Loddon River, Victoria (36° 08'S/143° 45'E).

Description: Rhomboidal lorica (Fig. 7a) with rounded corners, widest in first third. Head opening small, not drawn down ventrally. Foot-opening semicircular at widest point of caudal boundary of dorsal lorica, which is weakly arched towards interior. Three flexible foot-articulations, distalmost slender and elongated. Toes symmetrical, long, needle-like and straight (Fig. 7b). Lorica cross-section

shows highly vaulted dorsal lorica with slender downward-drawn lateral wings. Ventral plate with delicate double convex keel (Fig. 7c).

Measurements: Total length 135–140 µm, lorica height 48 µm, lorica length 96 µm, lorica width 92 µm, head-opening width 28 µm, foot-opening 28 × 28 µm, distal foot-articulation 19–20 µm, toe-length 33–36 µm.

Discussion: The new species has similarities with *Lepadella benjamini* Haring, 1916. In this species, however, the head-opening is cap-like, more or less ventrally drawn down, and the distal foot-articulation is not elongated (12–13 µm). Cf. also an Amazonian form described by Koste (1972, 1978) *L. benjamini* f. *brasilensis* with rounded side rims. The genus is reviewed by Chengalath (1976).

Etymology: Named after Rama Chengalath, National Museum of Canada, Ottawa, in appreciation of years of scientific cooperation and friendship with W.K.

Loc: L, Boort, Vic., Su; 23.5, 7.9, 6.0, 67, 420.

***Lepadella williamsi* n.sp.**

(FIG. 8a-d)

Holotype: Loricate female, sample number 657, coll. R. J. Shiel, 13.vi.79, Rot. No. 19, ZMK.

Paratype: SAM V.2904; number 657 Koste collection, Quakenbrück, D-4570 F.R.G.

Type locality: Ja-Ja Billabong, Jabiluka, N.T. (12° 40'S/133° 00'E).

Description: Smoothly oval, highly-vaulted lorica (Fig. 8d) with ventrally-directed head-opening. Dorsal lorica tapers caudally to a variable-length dorsal and laterally curved point (Figs 8a,b). Foot-opening narrow and ends at base of dorsal lorica projection. Only three flexible, approximately equal length foot segments visible. Last segment with long, dorso-laterally curved sharp toes.

Measurements: Total lorica length 112–116 µm, lorica height ~56 µm, lorica width 60–64 µm, toe length 36–40 µm, foot-opening 17–20 × 19–20 µm, head-opening 33–36 × 28–30 µm, distal foot-segment length 10 µm, caudal lorica projections 19–28 µm.

Discussion: The new species resembles the species group *L. acuminata*, which also occurs in Australia (Figs 9, 10), and which is characterised by a more or less elongated and occasionally split lorica point. However the margin of the foot-opening of this projection is closed (Fig. 9b, 10b). The lateral antennae, which are

dorsal to the basis of the caudal projection, in contrast to *L. williamsi* are very narrowly placed. In *L. acuminata* and its various modifications (Koste 1978) the dorsal margin of the head-opening is more or less concavely cut out.

The new species was previously seen in a sample from a tank near Kuala Lumpur, Malaysia collected by C. H. Fernando, University of Waterloo, Ontario, Canada.

Etymology: Named after W. D. Williams, Dept of Zoology, University of Adelaide for assistance in collecting rotifer material and support toward this work.

Loc: B, Jabiluka, N.T., W; 25.5, 6.15, 2.9, 5, 62.

Heteroleapdella ehrenbergi (Perty), 1950
Loc: B, Eskdale, Vic., Su; 29.2, 7.5, 8.0, 6, 85.

Family Lecanidae

Lecane hornemanni (Ehrenberg), 1834
Loc: B, Yea, Vic., A; 19.9, 7.2, 8.5, .8 m, 85.
B, Jabiluka N.T., W; 24.5, 6.3, 5.8, -, 59.

L. ludwigi (Eckstein), 1893
Loc: B, Jabiluka, N.T., W; 25.5, 6.15, 2.9, 5, 62.

L. aculeata (Jakubski), 1912
Loc: B, Jabiluka, N.T., W; 24.0, 6.25, 5.1, -, 42.

L. stichaea Harring 1913
Loc: R, Mannum, S.A., W; 11.0, 8.4, 10.8, 40, 575.

L. curvicornis (Murray), 1813
Loc: B, Jabiluka, N.T., W; 25.0, 6.2, 3.0, -, 48.

L. furcata (Murray), 1913
Loc: B, Jabiluka, N.T., W; 24.5, 6.3, 5.8, -, 59.

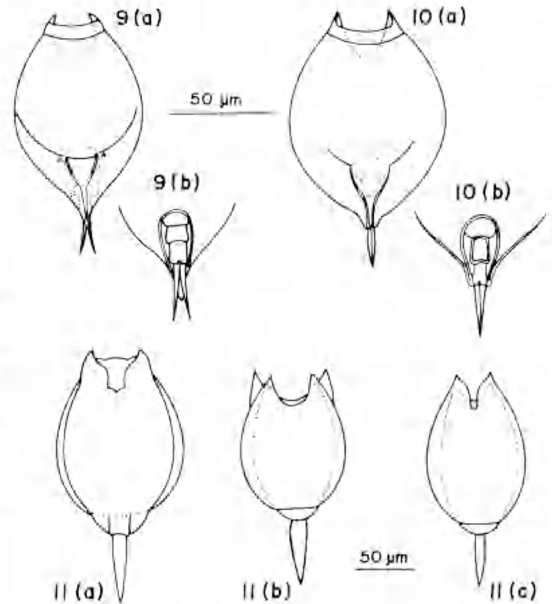
L. grandis (Murray), 1913
Loc: B, Jabiluka, N.T., W; 25.0, 6.2, 3.0, -, 48.

L. doryssa Harring, 1914
Loc: B, Jabiluka, N.T., W; 24.5, 6.3, 5.8, -, 59.

L. crepida Harring, 1914
Loc: B, Jabiluka, N.T., W; 25.0, 6.2, 3.0, -, 48.

L. tenuiseta Harring, 1914
Loc: B, Jabiluka, N.T., W; 25.0, 5.85, 2.2, -, 29.

L. lunaris crenata (Harring), 1923
Loc: L, Yarrowonga, Vic., Su; 24.2, 7.7, 8.6, -, 60.



Figs 9-11. 9—*Lepadella acuminata* (Ehrenberg), 1834 from N.T. a. Lorica, dorsal. b. Foot-opening and toes, ventral. Fig. 10—*L. acuminata* form with abbreviated caudal loric point from N.T., Australia. a. Dorsal. b. Foot-opening and toes, ventral. Fig. 11—*Lecane (Monostyla) hamata victoriensis* n.ssp. a. Ventral view, lorica contracted. b. *L. hamata hamata* Stokes 1896. c. *L. siruata* Hauer, 1938.

L. unguitata (Fadew), 1925
Loc: B, Jabiluka, N.T., W; 25.0, 6.2, 3.0, -, 48.

L. acronycha Harring & Myers, 1926
Loc: B, Jabiluka, N.T., W; 25.0, 6.2, 3.0, -, 48.

L. inopinata (Harring & Meyers), 1926
Loc: L, Wyangala, N.S.W., Su; 27.0, 7.4, 7.5, 0.5, 245.

L. pertica Harring & Myers, 1926
Loc: B, Jabiluka, N.T., W; 24.5, 6.3, 5.8, -, 59.

L. elsa Hauer, 1931
Loc: B, Alexandra Vic., Sp; 20.0, 7.2, 9.1, -, -.

L. nodosa Hauer, 1938
Loc: B, Jabiluka, N.T., W; 24.5, 6.3, 5.8, -, 59.

L. ruttneri Hauer, 1938
Loc: L, Boort, Vic., Su; 20.0, 7.4, 8.8.

L. hamata victoriensis n.ssp. (FIG. 11a)

Type material: 2 loricate ♀♀, sample number 263.
Holotype: loricate ♀, sample number 263, coll. R. J. Shiel (14.x.77) Rot. No. 029, ZMK.

Type locality: Billabong "Goulburn View", near Alexandra, Victoria (37°13'S/145°42'E) from *Juncus* bed, 30 cm depth.

Description: Both anterior points of dorsal lorica at head aperture are congruent with ventral lorica, therefore not visible. Whereas this aperture in type flat or deeply curved, in spp. it is a deep trapezoid notch, basally 8 μm wide, bordered by light, curved lines. Lorica outline widely oval. Ventral plate smaller than dorsal plate. Toe gradually tapering from point of insertion at second foot segment.

Discussion: Morphologically, this ssp. shows several characteristics in agreement with *L. (M.) sinuata* Hauer, 1938 (Fig. 11c). A similar rotifer also was described from India by Wulfert (1966) as *L. arcuata* (Bryce), however the notch between the anterior spines in this latter form are otherwise shaped, and significant differences are seen in the measurements.

Measurements (in μm) are given in the following sequence: overall length, dorsal plate, ventral plate anterior transverse width, toe length, form of neck opening for each form of *L. hamata*. f. *typica* 103–136, 61–88 \times 52–66, 77–98 \times 40–60, 18–30, 26–38 double semicircular. v. *sinuata* 108–110, 74–76 \times 53–55, 80–82 \times 41–46, 21, 28, curved. v. *arcuata* 100, 52 \times 56, 70 \times 40, 25, 28, semicircular. v. *thienemanni* 113–123, 64–70 \times 62–64, 77–88 \times 46–55, 26–35, 33–34, ventral flat-concave, dorsal straight. *victoriensis* 124, 84 \times 64, 92 \times 56, 24, 32, trapezoid. Fig. 11a shows morphological differences of the new spp. from that described by Stokes, 1896 (Fig. 11b). In contrast to *L. h. victoriensis*, *L. h. thienemanni* has a characteristic horizontal dorsal lorica margin, and the toe is distended in the middle.

Loc: B, Alexandra, Vic., Sp; 20.0, 7.2, 9.1, 2, 115.

Family Proalidae Bartos, 1959

Proales fallaciosa Wulfert, 1937

Loc: B, Jabiluka, N.T., W; 24.5, 6.3, 5.8, –, 59.

Family Lindiidae Dujardin, 1841

Lindia torulosa Dujardin 1841

Loc: B, Yea, Vic., W; 11.0, 7.2, 6.1, 17, 170.

L. deridderi Koste, 1979

Loc: B, Wodonga, Vic., W; 10.2, 7.2, 9.0, 4, 154.

Family Notommatidae Remane, 1933

Itura myersi Wulfert, 1935

Loc: B, Wodonga, Vic., Sp; 14.7, 7.1, 4.1, 5, 240.

Eothinia elongata (Ehrenberg), 1832

Loc: B, Wodonga, Vic., Sp; 14.7, 7.1, 4.1, 5, 240.

Monommata grandis Tessin, 1890

Loc: B Jabiluka N.T., W; 24.5, 6.3, 5.8. –, 59.

M. actices Myers, 1930

Loc: B, Jabiluka, N.T., W; 25.0, 6.15, 3.7, –, 48.

M. arndti Remane, 1933

Loc: B, Alexandra, Sp; 20.0, 7.2, 9.1, –, –.

Notommata glyphura Wulfert, 1935

Loc: B, Alexandra, Vic., A; 17.8, 7.2, 8.9, 8, –.

Cephalodella eva (Gosse), 1886

Loc: B, Eildon, Vic., A; 17.9, 7.2, 9.2, 0.5, 87.

C. mucronata Myers, 1924

Loc: R, Mungindi, N.S.W., A; 16.0, 8.1, 9.2, –, –.

C. panarista Myers, 1924

Loc: B, Jabiluka, N.T., W; 25.5, 6.2, 2.9, –, 62.

C. ventripes Dixon-Nuttall, 1901

Loc: B, Wodonga, Vic., Sp; 14.7, 7.1, 4.1, 5, 240.

Family Trichocercidae Remane, 1933

Trichocerca cavia (Gosse), 1889

Loc: B, Eildon, Vic., A; 18.0, 7.1, 11.0, 0.5, 70.

T. collaris (Rousselet), 1896

Loc: B, Jabiluka, N.T., W; 24.5, 6.3, 5.8. –, 59.

T. chattoni (De Beauchamp), 1907

Loc: L, Wyangala, N.S.W., Su; 27.0, 7.4, 7.5, 0.5, 245.

T. myersi (Hauer), 1931

Loc: B, Jabiluka, N.T., W; 24.0, 6.25, 5.1, –, 42.

T. flagellata Hauer, 1937

Loc: B, Jabiluka, N.T., W; 18.0, 6.1, 6.7, –, 63.

T. mus Hauer, 1938

Loc: L, Nagambie, Vic., Su; 15.0, 7.4, 8.9, 1.3m, –.

T. jenningsi Voigt, 1957

Loc: B, Jabiluka, N.T., A; 29.0, 6.5, 2.9, –, 28.

T. similis grandis (Hauer), 1965

Loc: B, Wodonga, Vic., Sp; 15.5, 7.0, 10.8, 16, 43.

T. agnatha Wulfert, 1939

Loc: R, Echuca, Vic., Su; 15.0, 7.6, 9.0, —, —.

Ascomorphella polyocicola (Plate), 1886

Loc: B, Thornton, Vic., A; 12.4, 7.1, 8.6, 2.5, 115.

Family Gastropodidae Remane, 1933

Ascomorpha saltans Bartsch, 1870

Loc: L, Burrinjuck, N.S.W., Su; 26.0, 7.6, 8.0, 1, 190.

Family Synchaetidae Remane, 1933

Synchaeta tavina tavina Hood, 1893

Loc: L, Kerang, Vic., W.

S. litoralis Rousselet, 1902

Loc: B, Wodonga, Vic., W; 10.2, 7.2, 9.0, 4, 154.

Family Diceranophoridae Remane, 1933

Diceranophorus uncinatus (Milne), 1886

Loc: B, Wodonga, Vic., A.

D. aquilus (Gosse), 1887

Loc: R, Mungindi, N.S.W., A; 16.0, 8.1, 9.2, —, —.

***Diceranophorus claviger australiensis* n.ssp.**

(FIG. 12a,b)

Type material: 14 ♀♀, sample number 669.

Holotype: female, coll. 13.vi.79, R. J. Shiel, Rot. No. 027, ZMK.

Type locality: Ja Ja Billabong, Magela Creek floodplain, confluent of Alligator River near Jabiluka, N.T. (12°40'S/132°50'W).

Description: Elongate spindle-shaped body. Integument rigid, longitudinal lines from neck to short horizontal line on dorsal part. Head part cylindrical with moderate concave outlines. Small prolongation of dorsal lorica over foot. Toes extremely long and slender, curve somewhat outward, end in acute pointed claws seen only in lateral view. Corona with two frontal eyes and paired knobbed palps. Trophi large. Rami terminate with small teeth as in the trophi of *D. caudatus* (Fig. 12c) but have broad lamellar alula, which are apically elongated, ending in pair of double short teeth. Unci each have only a tooth. Short fulcrum has broad triangular form. Manubria slightly curved, spatulate ended. Beneath unci contact point is lamellar triangular element. Preservation in formalin precludes discussion of internal organization.

Discussion: This species is related to *D. caudatus*, from Victoria, and *D. claviger*, from South America by virtue of its morphology. Comparative information on the related forms is given below. Affinity of this ssp. with *D. claviger* (Hauer) 1965 is suggested by the palp number and similar trophi structure, although *D. claviger* (= *Itura claviger* Hauer, 1965) has a different shaped fulcrum, shorter toes and a significantly shorter overall length.

Measurement (in μm) and comments are given in the sequence overall length, greatest width, palp number, palp length, toe length, trophi length, manubrium form, unci, fulcrum, rami, manubrium, teeth on ramus point, supra-rami teeth, supra-rami teeth length, distribution: *D. caudatus* Ehrenberg, 180–310, 90, 1, 9–10, 69–77, 34–36, sticklike, 13, 6, 21, 25, —, absent, —, cosmopolitan; *D. caudatus braziliensis* Koste, 1972, —330, —, ?, ?, 84–88, 48, terminally crutch-like, 32, 8, 26, 32, 4, absent, —, Amazon, S. America; *D. claviger* (Hauer) 274, 100, 2, 16, 24–44, 41–46, terminally broad, 17, 11, 32, 24, 4–5, oralplate (?), —, Amazon, S. America; *D. claviger* n.ssp., —532, —120, 2, —21, 155–164, 50–53, terminally broad, 34, 13, 40, 39, 6, present, 18, N. Aust.

Loc: B, Jabiluka, N.T., W; 23.5, 5.8, 2.4, —, 30.

Aspelta psitta Harring & Myers, 1928

Loc: B, Wodonga, Vic., W; 10.2, 7.2, 9.0, 4, 154.

Encentrum gibbosum Wulfert, 1936

Loc: R, Wangaratta, Vic., A; 12.0, 7.7, 10.0, —, —.

ORDER GNESIOTROCHA De Beauchamp, 1965

Family Testudinellidae

Testudinella parva (Ternetz), 1892

Loc: B, Jabiluka, N.T., W; 25.0, 6.2, 3.0, —, 48.

T. emarginula (Stenroos), 1898

Loc: B, Yea, Vic., A; 12.0, 7.3, 9.8, —, —.
R, Benalla, Vic., Su; 27.0, 7.6, 7.0, —, —.

T. tridentata Smirnov, 1931

Loc: L, Yarrawonga, Su; 24.2, 7.7, 8.2, 22, 160.
B, Jabiluka, N.T., W; 24.5, 6.3, 5.8, —, 59.

T. amphora Hauer, 1938

Loc: B, Jabiluka, N.T., W; 24.5, 6.3, 5.8, —, 59.

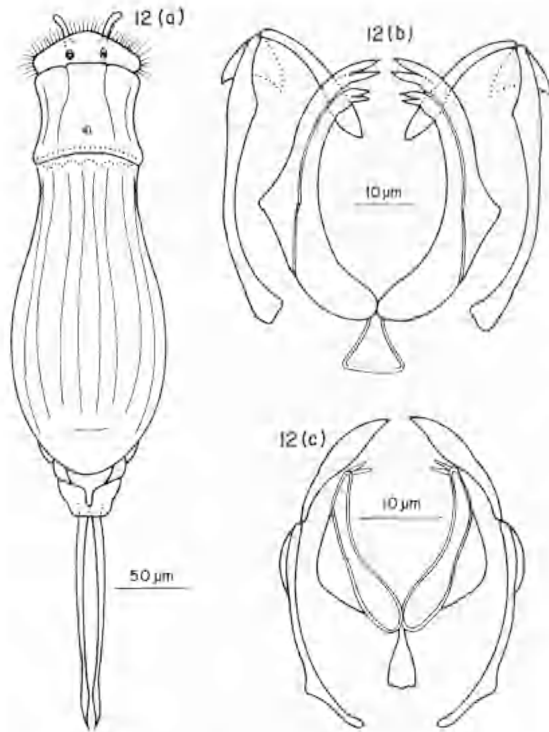


Fig. 12. *Dicanophorus claviger australiensis* n.ssp. a. Dorsal view, total length 532 μm . b. Trophi, dorsal view, length 53 μm . c. Comparative view of trophi of *D. caudatus* (Ehrenberg, 1834), length 35 μm .

***Testudinella walkeri* n.sp.**

(FIG. 13a,b,c,d,e)

Type material: 6 ♀♀, preserved in formalin, sample number 659.

Holotype: Loricated female, sample number 659, coll. 13.vi.79, R. J. Shiel, Rot. No. 020, ZMK.

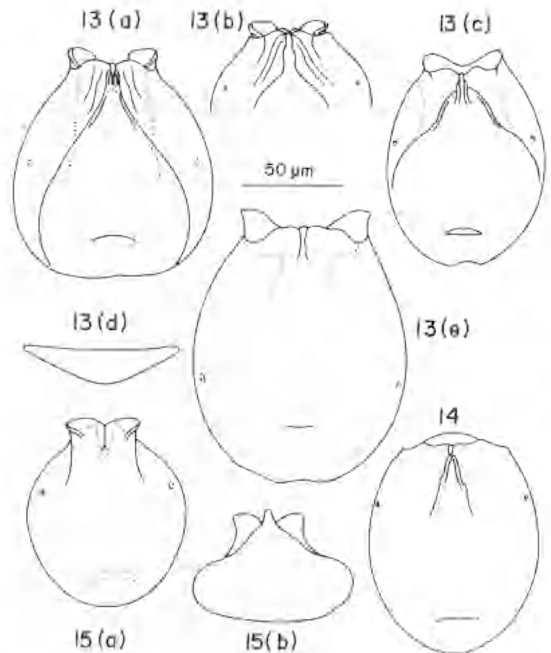
Type locality: Mine Valley billabong, Magela Creek floodplain, tributary of Alligator River near Jabuluka, N.T. (12°40'S/132°50'E).

Description: Juvenile lorica (Fig. 13b,e) widely oval, strongly circular outline in adults (Fig. 13a). Dorsal lorica slightly concave at widest point. Ventral lorica under neck-aperture with keel-like folding, two edges of which curve outwards to lower lorica rim. Foot-opening slit-like under middle of ventral lorica. Dorsal anterior rim of head-aperture with rounded, bulge, medially lightly notched (Fig. 13b). In poor preparations this can appear concave (Fig. 13c). Lorica end with shallow indentation. Lateral antennae located slightly above lorica midline. Lorica cross-section shallow, triangular (Fig. 13d).

Measurements: Lorica length overall 100–112 μm , greatest lorica width 75–98 μm , neck aperture width 40–44 μm , greatest lorica height in midline 20–25 μm , foot-opening 20 μm over the posterior lorica rim, foot-opening width 20–24 μm .

Discussion: The new species belongs on the Formenkreis *incisa* (see Koste 1978). A typical form from this group from the same sample is shown in Fig. 14. All are described with oval or egg-shaped lorica outlines, as are the adult individuals of the *brycei-amphora* group (Koste 1978). With the exception of *T. amphora* Hauer, 1937, neither of these groups has the ear-shaped lateral elevation of the dorsolateral rim of the neck aperture.

The new species is characterised by this projection on the upper rim of the wide lorica, by the presence of the two prominent ventral diverging lines which begin at the keel-like crease under the ventral margin of the neck aperture.



Figs 13–15. 13—*Testudinella walkeri* n.sp. a. Ventral. b. Anterior lorica detail, contracted. c. Juvenile lorica, ventral. d. Lorica cross-section. e. Species from Malaysia, lorica, ventral. Single individual collected, Fig. 14—*T. incisa* var. *emarginula* (Stenroos), 1898, Lorica length 110 μm , lorica width 85 μm . Fig. 15—*T. amphora* Hauer, 1937 from N.T. a. Dorsal. b. Ventral, oblique. Lorica length 96 μm , lorica width 78 μm .

A lorica of similar form but lacking the wide ventral keel was found in a sample from Malaysia (coll. C. H. Fernando, University of Waterloo, Canada).

Comparative measurements (in μm) are given in the sequence lorica length, lorica width, foot-opening, neck aperture, lorica cross-section: *T. walkeri* n.sp., 100–112, –98, slitlike, with lateral "ears" 40–44, shallow triangular; *T. sp.* from Malaysia, 136, 84, angular 16 \times 10, with "ears" 64, shallow triangular; *T. amphora*, 90–95, 60–78, slitlike 18–20, with "ears", triangular; *T. brycei*, 85, 58, slitlike, medially tongue-shaped, triangular; *T. incisa* v. *emarginula*, 80–130, 65–82, slitlike, medially shallow, tongue-shaped shallow triangular.

Loc: B, Jabiluka, N.T., W; 24.5, 6.3, 5.8, –, 59.

Etymology: Named after Dr K. F. Walker, Department of Zoology, University of Adelaide, in appreciation of support during a Ph.D. program by RJS.

Family Flosculariidae Harring, 1913

Ptygura furcillata (Kellicott), 1889

Loc: L, Boort, Vic., Su; 23.5, 7.9, 6.0, 67, 750.

P. meliceria v. *mucicola* (Kellicott), 1889

Loc: B, Wadonga, Vic., Su.

P. tacita Edmondson, 1940

Loc: B, Yea, Vic., A; 19.9, 7.2, 8.5, .8 m. 85,

Family Hexarthridae Bartos, 1959

Hexarthra polyodonta (Hauer), 1957

Loc: B, Seymour, Vic., Sp; 18.0, 7.2, 9.4, –, 265.

Family Filiniidae Bartos, 1959

Filinia holmanni Koste, 1980

Loc: R, Mannum, S.A., Su, A; –28.0, 7.7–8.4, –10.8, –135, –1080.

F. australiensis Koste, 1980

Loc: R, Mannum, S.A., Su; 17.0, 8.2, 9.7, 88, 1020.

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